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This study was to improve paramterizations for 3 and 4 wave nonlinear interactions in shallow water. Models for wave shoaling were improved and tested. The improved models have increased skill in predicting the observed evolution of wave breaking and evolution across the shoaling region and surf zone. In addition, during this study it was discovered that there is a large increase in directional spreading of waves as they propagate across the surf zone. Also, this study showed that nonlinear interactions transfer energy from swell and sea waves to higher frequnecy motions, where presumably dissipation takes place. Consequently, wave breaking in the surf zone includes a nonlinear energy transfer from lower–frequency sea and swell to higher–frequency motions, followed by dissipation of the higher frequency motions.

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Results from this project are described in the following publications:

Herbers, T.H.C., Steve Elgar, and R.T. Guza, 1999. Directional spreading of waves in the nearshore, *J. Geophysical Research* **104**, 7683-7693.

Herbers, T.H.C., N.R. Russnogle, and Steve Elgar, 2000. Spectral energy balance of breaking waves within the surf zone, *J. Physical Oceanography* **30**, 2723-2737.

Herbers, T.H.C., Steve Elgar, N.A. Sarap, and R.T. Guza, Dispersion Properties of Surface Gravity Waves in Shallow Water, *J. Physical Oceanography*, **in press**.